

ELECTRONIC BOOK HAVING LIBRARY CATALOG MENU AND SEARCHING FEATURES

Related Applications

This application is a continuation-in-part of Application Serial Number 08/336,247, filed November 7, 1994, entitled ELECTRONIC BOOK SELECTION AND DELIVERY SYSTEM, which is a continuation-in-part of Application Serial Number 07/991,074, filed December 9, 1992, entitled TELEVISION PROGRAM PACKAGING AND DELIVERY SYSTEM WITH MENU DRIVEN SUBSCRIBER ACCESS and U.S. Serial No. 08/160,194, entitled ADVANCED SET-TOP TERMINAL FOR CABLE TELEVISION DELIVERY SYSTEMS, filed December 9, 1993, all of which are incorporated herein by reference.

The present application is related to application of John S. Hendricks, entitled "Electronic Book with Electronic Links" and filed on even date herewith, which is incorporated herein by reference.

Background Of The Invention

Sparked by the concept of an information superhighway, a revolution will take place in the distribution of books. Not since the introduction of Gutenberg's movable typeset printing has the world stood on the brink of such a revolution in the distribution of text material. The definition of the word "book" will change drastically in the near future. Due to reasons such as security, convenience, cost, and other technical problems, book and magazine publishers are currently only able to distribute their products in paper form. This invention solves the problems encountered by publishers.

Summary Of Invention

A first system consistent with the present invention produces an electronic signal containing a representation of textual data. The system transmits and receives the electronic signal, and it displays a particular library menu relating to the textual data and based upon a user-entered selection.

1 A second system consistent with the present invention produces an electronic
2 signal containing a representation of textual data. The system transmits and receives
3 the electronic signal, and it searches the textual data, based upon a user-entered
4 parameter, in order to locate a portion of the textual data relating to the parameter.

5 A first method consistent with the present invention includes coding text data
6 onto an electronic signal. The electronic signal is transmitted over a transmission
7 medium and received from the transmission medium. A particular library menu is
8 displayed relating to the textual data and based upon a user-entered selection.

9 A second method consistent with the present invention includes coding text
10 data onto an electronic signal. The electronic signal is transmitted over a transmission
11 medium and received from the transmission medium. The textual data is searched,
12 based upon a user-entered parameter, in order to locate a portion of the textual data
13 relating to the parameter.

14 A third method consistent with the present invention generates and displays a
15 particular menu for a plurality of electronic books. A plurality of electronic books are
16 stored for display on an associated viewer. A request is received from a user for a
17 menu relating to the electronic books. The menu is generated, based upon the user's
18 request, and displayed on the viewer.

19 A fourth method consistent with the present invention searches a plurality of
20 electronic books. A plurality of electronic books are stored for display on an
21 associated viewer. A request is received from a user for a search relating to the
22 electronic books. The search of the electronic books is performed based upon the
23 user's request, and results of the search are displayed on the viewer.

24 Brief Description Of The Drawings

25 Figure 1 is a block diagram of the primary components of the electronic book
26 selection and delivery system.

1 Figure 2 is a schematic showing an overview of the electronic book selection
2 and delivery system.

3 Figure 3 is a schematic of the delivery plan for the electronic book selection
4 and delivery system.

5 Figure 4 is a block diagram of the operations center.

6 Figure 5a is a flow diagram of the processing at the operations center and
7 uplink.

8 Figure 5b is a block diagram of the hardware configuration for an uplink site.

9 Figure 6a is a block diagram of the hardware configuration for a four
10 component home subsystem.

11 Figure 6b is a block diagram of the hardware configuration for a single
12 component viewer and library for a home subsystem.

13 Figure 6c is a schematic of a two unit home subsystem.

14 Figure 7 is a flow diagram of the processes performed by the video connector.

15 Figure 8 is a block diagram for an example of a library unit.

16 Figure 9 is a flow diagram of some of the processes performed by the library
17 on the received data stream.

18 Figure 10 is a flow diagram of the processes performed by the library unit on
19 information requests from the viewer.

20 Figure 11 is a block diagram showing the components for an example of a
21 viewer.

22 Figure 12a is a flow diagram of some of the processes performed by the viewer
23 on an information request from a subscriber.

24 Figure 12b is a flow diagram of a process performed by the viewer on an
25 information request from a subscriber to display various library menus.

26 Figure 12c is a flow diagram of a process performed by the viewer on an
27 information request from a subscriber to search for electronic books.

1 Figure 13 is a chart depicting the menu structure and sequencing of menus in
2 the menu system.

3 Figure 14a is a schematic of an introductory menu.

4 Figure 14b is a schematic showing an example of a main menu.

5 Figure 14c through Figure 14q are schematics showing examples of submenus.

6 Figure 14r is a schematic showing another example of a main menu.

7 Figure 14s and Figure 14t are schematics showing examples of screens for a
8 book.

9 Figure 14u is a schematic showing an example of a main menu.

10 Figure 14v is a schematic of an electronic book classification system.

11 Figure 14w is a schematic showing an example of a menu for presenting
12 search options.

13 Figure 15 is a schematic diagram of an electronic book system for a bookstore
14 or public library.

15 Figure 16a and Figure 16b are schematics of hardware modifications or
16 upgrades to a set top converter.

17 Figure 17 is a schematic showing a set top terminal that includes a data
18 receiver and data transmitter.

19 Figure 18a is a schematic of a book-on-demand system.

20 Figure 18b is a schematic of an operations center supporting a book-on-
21 demand system.

22 Detailed Description

23 The electronic book selection and delivery system is a new way to distribute
24 books to bookstores, libraries, and consumers. The technological breakthroughs of
25 this invention provide a secure electronic system for both delivering selected books
26 and receiving payments. The system has an unusual combination of features that

1 provides the consumer with a daily use household appliance that has a high tech aura
2 while being very practical, portable, and easy to use.

3 The clear advantage of the system is that it eliminates the distribution of any
4 physical object such as a paper book or computer memory device from any book
5 distribution system. The purchase of a book becomes a pay-per-read™ event avoiding
6 the overhead, "middle-men," printing costs, and time delay associated with the current
7 book distribution system. Published material and text such as the President's speech,
8 a new law, a court decision on abortion, or O.J. Simpson's testimony can be made
9 immediately available to the consumer at a nominal fee.

10 The system is a novel combination of new technology involving the television,
11 cable, telephone, and computer industries. It utilizes high bandwidth data
12 transmissions, strong security measures, sophisticated digital switching, high
13 resolution visual displays and user friendly interface software.

14 The primary components of the text delivery system are the subsystem for
15 placing the text onto a video signal and the subsystem for receiving and selecting text
16 that was placed on the video signal. The preferred embodiment of the system includes
17 additional components and optional features that enhance the system. The system
18 may be configured for use by bookstores, libraries, and consumers.

19 The system for consumer use is made up of four subsystems, namely: (1) an
20 Operations center, (2) a video distribution system, (3) a home subsystem including
21 reception, selection, viewing, transacting and transmission capabilities, and (4) a
22 billing and collection system.

23 The Operations center performs several primary functions: manipulating text
24 data (including receiving, formatting and storing of text data), security encoding text,
25 cataloging books, providing a messaging center capability, and performing uplink
26 functions. The system delivers the text from the Operations center to consumer
27 homes by inserting data within analog video signals. The insertion of text is generally

1 performed with a text generator and an encoder at an uplink site that is within or near
2 the Operations center. The system can be several lines of the Vertical Blanking
3 Interval (VBI), all the lines of the analog video signal, or a digital video signal to
4 transmit text data. Using the VBI delivery method, the top ten or twenty book titles
5 may be transmitted with video during normal programming utilizing existing cable or
6 broadcast transmission capability without disruption to the subscriber's video
7 reception. Using the entire video signal, thousands of books may be transmitted
8 within just one hour of air time. Nearly any analog or digital video distribution
9 system may be used to deliver the video signal with included text.

10 The home subsystem performs four primary functions: connecting to the
11 video distribution system, selecting text, storing text, and transacting through a phone
12 or cable communicating mechanism. The components of the home subsystem may be
13 configured in a variety of hardware configurations. Each function may be performed
14 by a separate component, the components may be integrated, or the capability of
15 existing cable set top converter boxes and televisions may be utilized. Preferably, a
16 connector, library unit and viewer unit are used. The connector portion of the home
17 subsystem receives the analog video signal and strips or extracts the text from the
18 video. The home library stores the text signal, provides a user friendly software
19 interface to the system and processes the transactions at the consumer home. The
20 viewer provides a screen for viewing text or menus.

21 The viewing device is preferably a portable book shaped viewer which stores
22 one or more books for viewing and provides a screen for interacting with the home
23 library unit. A high resolution LCD display is used to both read the books and to
24 interact with the home library software. An optional phone connector or return-path
25 cable connection initiates the telephone calls and, with the aid of the library, transmits
26 the necessary data to complete the ordering and billing portion of the consumer
27 transaction. The billing and collection system performs transaction management,

1 authorizations, collections and publisher payments automatically utilizing the
2 telephone system.

3 As shown in Figure 1, the primary components of the electronic book selection
4 and delivery system 200 are an encoder 204, a video distribution system 208, a
5 connector 212, and a text selector 216 as shown in Figure 1. The encoder 204 places
6 textual data on a video signal to form a composite signal. A variety of equipment and
7 methods may be used to encode text data onto a video signal. The video distribution
8 system 208 distributes the video signal from the single point of the encoder 204 to
9 multiple locations which have connectors 212. The connector 212 receives the digital
10 or analog video signal from the video distribution system 208 and separates, strips or
11 extracts the text data from the composite video signal. If necessary, the extracted text
12 data is converted into a digital bit stream. Text selector 216 works in connection with
13 the connector 212 to select text.

14 Using a connector 212 and text selector 216 combination, various methods of
15 selecting and retrieving desired text from a composite or video signal are possible.
16 Text may be preselected, selected as received or selected after being received and
17 stored. The preferred method is for the connector 212 to strip all the text from the
18 video signal and have the text selector 216 screen all the text as received from the
19 connector 212. The text selector 216 only stores text in long term or permanent
20 memory if the text passes a screening process described below.

21 An overview of a preferred embodiment is shown in Figure 2. The system 200
22 includes: an operations center 250 including an uplink site 254, a video distribution
23 system 208, a home subsystem 258 including a video connector 212, a library 262, a
24 viewer 266, and a phone connector 270, and telephone system 274 and a billing and
25 collection subsystem 278. The operations center receives textual material from
26 outside sources 282 such as publishers, newspapers, and on-line services. The
27 operations center 250 receives this textual material in various digital formats and

1 converts them to a standard compressed format for storage. In so doing, the
2 operations center 250 creates a pool of textual material that is available to be delivered
3 to the home system. Normally, the text material is grouped by books or titles for easy
4 access. The operations center 250 includes an uplink site for placing the text onto a
5 video signal and sending the composite video signal into a video distribution system.
6 The uplink site would generally include an encoder (not shown in Figure 2) to encode
7 the text onto a video signal.

8 Many analog and digital video distribution systems 208 can be used with this
9 text delivery system 200, such as, cable television distribution systems, broadcast
10 television distribution systems, video distributed over telephone systems, direct
11 satellite broadcast distribution systems, and other wire and wireless distribution
12 systems. Nearly any distribution system which can deliver a video signal will work
13 with the text delivery system. It is also possible to distribute the text without using a
14 video signal as described below. For example, the text may be represented and
15 transmitted within an electronic signal through a network 201, such as the Internet or a
16 wide area or local area network. The transmission through the network 201 may
17 include analog or digital electronic signals using wire or wireless transmission, and it
18 may include known techniques for transmitting signals through a network such as the
19 Internet.

20 The home subsystem performs five primary functions, (1) connecting with a
21 video distribution system, (2) selecting data, (3) storing data, (4) displaying data, and
22 (5) handling transactions. An important optional function of the home sub-system is
23 communicating using a telephone communication system. The home subsystem is
24 made up of primarily four parts: a video connector 212 or similar type of connector
25 for connecting with a video distribution system, a library unit 262 for storing and
26 processing, a viewer unit 266 for viewing menus and text and a telephone connector
27 270 for connecting with a telephone communications system 274.

1 The billing and collection subsystem 278 may be co-located with the
2 operations center 250 or located remote from the operations center. The billing and
3 collection subsystem 278 is in communication with the home subsystem via
4 telephone-type communication systems. Any of a number of telephone type
5 communication systems, such as, a cellular system, will operate with the billing and
6 collection system. The billing and collection system 278 records the books or
7 portions of text that are selected or ordered by the subscriber. The billing and
8 collection system 278 will charge a subscriber's credit account or bill the subscriber.
9 In addition, the billing and collection system 278 will monitor that amount due to
10 publishers or other outside sources 282 who have provided textual data or other
11 services such as air time to enable the text delivery system 200 to operate.

12 Figure 3 is an expanded overview of a preferred delivery plan for the
13 electronic book selection and delivery system 301. It is a comprehensive delivery plan
14 to support various types of users and various billing systems. Figure 3 shows that
15 publishers 282 will provide text transfer 302 to the operations center 250' and receive
16 payments 306 from the billing and collection system 278'. A separate channel uplink
17 site 254' is shown in this configuration receiving data 310 from the operations center
18 250'. The operations center 250' has three separate sections (318, 322, 326) one for
19 text receiving, formatting and re-entry 318, a second for security encoding 322 and a
20 third section for catalog and messaging center functions 326.

21 The collection and billing system 278' shown has two sections (330, 334) one
22 for transaction management, authorizations and publisher payments 330, and the other
23 for customer service 334. The customer service section 334 provides for data entry
24 and access to customer account information. Transaction accounting information 338
25 is supplied to credit card companies 342 by the transaction management section 330
26 of the billing and collection system 278'. The credit card companies 342 provide
27 billing 346 to customers either electronically or by mail.

1 Three methods for communicating between the subscriber base 348 and the
2 billing and collection system 278' are shown: by telephone switching 350 alone,
3 cellular switching 354 and telephone switching 250 combined, and by use of the cable
4 system 358 and the telephone switching 350. The system shown supports both one-
5 way 362 and two-way cable communication 366 with subscribers. Libraries and
6 schools 370 as well as bookstores 374 may use the delivery system.

7 Libraries and schools 370 would have a modified system to allow the viewer
8 to be checked-out or borrowed while bookstores 374 would rent or sell the viewer and
9 sell electronic book data. The bookstores 374 as well as the libraries and schools 370
10 may be serviced by cable 378. Optional direct broadcast systems (DBS) 382 can also
11 be used with the system 200.

12 I. The Operations Center

13 Figure 4 is a schematic of an operations center 250 which includes an uplink
14 254. The Operations center 250 gathers text or books by receiving, formatting,
15 storing, and encoding. A data stream 302 containing text is received at the operations
16 center by a data receiver 402. The data receiver 402 is under the control of a
17 processor 404. After reception, the data stream is formatted using digital logic for
18 formatting 406 which is also under the control of the processor 404. If any additional
19 text is being generated at the operations center 250 locally for insertion into the
20 distributed signal, the text generation is handled through text generator hardware 410
21 which may include a data receiver and a keyboard (not shown). Following processing
22 by the text generator, the additional text can be added to the text received the
23 combining hardware 414 that includes digital logic circuitry (not shown).

24 The processing at the operations center is controlled by a processor 404 which
25 uses an instruction memory 416. The processor and instruction memory may be
26 supplied by a personal computer or mini-computer. To perform the catalog and

1 messaging functions, the operations center 250 uses a catalog and message memory
2 420 and the text generator 410 if necessary.

3 The data stream of text, catalog and messages is preferably encoded by a
4 security encoding module prior to being sent to the uplink module 254. Various
5 encoding techniques may be used such as the commercial derivative of NSA's
6 encryption algorithm, Data Encryption System (DES), and General Instrument's
7 DigiCipher II may be used by the security encoding module 424. Following encoding,
8 the encoded text may be stored in text memory 428 prior to being sent the uplink 254.
9 It is preferred that a first-in-first-out text memory arrangement is used under the
10 control of the processor 404. Various types of memory may be used for the text
11 memory 428 including RAM. The operations center may use file server technology
12 for the text memory 428 to catalog and spool books for transmission as is described
13 below.

14 To transmit textual data, the delivery system 200 may use high bandwidth
15 transmission techniques such as those defined by the North American Broadcast
16 Teletext Standard (NABTS) and the World System Teletext (WST) standard. Using
17 the WST format (where each line of the Vertical Blanking Interval contains 266 data
18 bits), a four hundred page book, for example, may be transmitted during programming
19 using four lines of the Vertical Blanking Interval at a rate of approximately one book
20 every 1.6 minutes (63,840 bits per second). Alternatively, books may be transmitted
21 over a dedicated channel, which interrupts programming so that 246 lines of video can
22 be used to transmit approximately 2,250 books every hour (3.9 Mbits per second). A
23 teletext type format is the simplest but possibly the slowest text format to use with the
24 system. In either event, an encoder is utilized at an uplink site to insert textual data
25 into the analog video signal. In many other respects, the delivery of the textual
26 information is completed using existing cable television plants and equipment.
27 Finally, textural and graphical information may be transmitted over any

1 telecommunications network including a public switched telephone network (PSTN)
2 and the Internet.

3 Figure 5a is a flowchart of the steps involved in processing text from the
4 publisher or provider 282 that occurs at the operations center 250. As shown in block
5 500, the publisher 282 processes data files of text for books, compresses, encrypts and
6 sends the data files to the operations center or uplink. Text files for books are
7 preferably sent one book at a time. As shown in block 504, the uplink 254 or
8 operations center 250 receives and processes the data stream from the publisher 282.
9 Generally, part of this processing includes encryption and error correction.

10 As shown in block 508, files are broken into smaller packets of information.
11 Header information is added to the packets. The bit stream is converted from a serial
12 digital bit stream to an analog bit stream that is compatible with an NTSC video
13 signal. Block 512 shows the switching of analog data into the video lines of a video
14 signal. The analog data is either placed in the VBI or the active video lines.

15 Figure 5b is an example of a hardware configuration to perform some of the
16 functions for blocks 508 and 512. A video feed 516 is received and processed through
17 a sync stripper 520. The sync signal 532 is used by the digital logic control 524. The
18 digital logic control 524 receives the sync signal 532 and a serial digital bit stream 528
19 for processing. The digital logic control 524 passes the serial digital bit stream to the
20 Digital to Analog converter 536 and outputs a control signal 540 for the video switch
21 544. The video switch 544 integrates the video feed 516 and analog data stream 548
22 into a video feed with analog data signal inserted 552.

23 As an alternative to cable or television delivery methods, the telephone system
24 may be used to transmit books to the subscribers. An average book would take about
25 7 minutes to transmit over the public telephone system. Using the telephone system,
26 it is not necessary to combine video and text into a composite signal. In most other
27 respects, the operations center would remain similar whether text delivery was by

1 telephone or cable. It is preferred that file server technology (such as that described in
2 U.S. Patent No. 5,262,875, entitled AUDIO/VIDEO FILE SERVER INCLUDING
3 DECOMPRESSION/PLAYBACK MEANS, issued to Mincer, et al., and, U.S. Patent
4 No. 5,218,695, entitled FILE SERVER SYSTEM HAVING HIGH-SPEED WRITE
5 EXECUTION, issued to Noveck, et al., both of which are incorporated herein by
6 reference) be used at the operations center 250 with a telephone system text delivery
7 method. The telephone transmission may occur, for example, through network 201,
8 such as the Internet, or through telephone system 274.

9 II. The Home Subsystem

10 The hardware configuration for a four component home subsystem 258 is
11 shown in Figure 6a. Figure 6c shows a hardware configuration for a two component
12 home subsystem. The home subsystem 258 performs several functions, such as
13 receiving data and video transmissions, stripping the data from the video signal,
14 screening and storing the data, providing user friendly interface software, displaying
15 menus and text, processing transactions, initiating telephone calls and transmitting
16 billing data. Various hardware configurations may be utilized to achieve the desired
17 functions of the home subsystem. For example, as shown in Figure 6c, the home
18 subsystem 258 can be configured to utilize the reception and channel tuning capability
19 of the current installed subscriber base of cable converter boxes and televisions 601.
20 The home subsystem 258 can also be designed as an advanced set top terminal
21 converter box with menu generation capability, electronic memory and a telephone
22 modem as described in section V below.

23 The electronic components which make up the home subsystem 258 can be
24 arranged in a variety of ways. In the four unit subsystem of Figure 6a the viewer 266
25 and library 262 are wired together while the remaining components communicate
26 through RF transceivers 604. In this version of the home subsystem 258 the library
27 262 and viewer 266 are housed as two units. In another version of the home

1 subsystem 258, as shown in Figure 6b, the functions of library 262 reside within the
2 viewer 266 as one unit, and both the library 262 and the viewer 266 are contained
3 within a common housing.

4 Figure 6c shows a two unit home subsystem with certain optional features.
5 The viewer 266 is generally equipped with a high resolution viewing area 602, digital
6 logic (including a key 605, security 606, and a microprocessor 621), video graphics
7 control and memory 607, power supply circuitry 602 (not shown), an optional battery
8 603 and an optional RF transceiver 604. In a two unit arrangement, the library 262
9 contains the connector function to the delivery system 200, connector function to a
10 public telephone communications system, and memory 600 (which may be removable
11 and portable 600'). More specifically, the library 262 would include data stripping
12 functions 617, digital logic 609, memory storage 600, power circuitry 610, optional
13 telephone connections 611 (including cellular or PCN 611'), optional battery (not
14 shown), optional tuner module 613 and an optional RF transceiver 604. The video
15 connector 212 and the public telephone system connection 270, as well as the
16 removable portable memory unit 600 of the library may be broken out into separate
17 components. (Figure 6c shows a removable portable hard disk memory 600' with
18 removable cartridges 614.)

19 The home system 258 may include an attached keyboard 267 or a wireless
20 keyboard 268. Both the attached keyboard 267 and the wireless keyboard 268 may be
21 used to communicate with the viewer 266 or the library unit 262. The wireless
22 keyboard 268 may communicate via radio frequency (RF) signaling, for example.
23 Therefore, the home subsystem 258 may have as many as six separate components
24 which communicate with each other. The two, three, four, five, or six separate
25 components which make up the home subsystem 258 can communicate with each
26 other in a variety of ways, including hardwired connection 615, RF transceiver 604
27 and other wireless methods.

1 RF communications are preferred in the home because they allow the separate
2 components to be located throughout the home without restriction. The data
3 communicated between the units is preferably secure data. In addition, the library 262
4 may provide power to the viewer 266 through the hardwired communication link 615.

5 To receive and strip the data from the video signal at the consumer's home,
6 either a cable interface device or cable connector is used. The cable connector device
7 includes a tuner 613, while the cable interface device makes use of existing tuning
8 equipment in the home. In either configuration, data is stripped from the video signal
9 and stored at the subscriber's location in the library 262. The phone connector 270
10 and modem 611 initiate telephone calls and transmit ordering and billing information
11 to the operations center 250 or billing and collection system 278. The phone
12 connector 270 may also be used to receive electronic books from the delivery system
13 200. The library 262 is the intelligent component of the home subsystem 258,
14 incorporating the hardware and software necessary to store the text data, generate
15 menus and effect the purchase transactions. In addition to an RF transceiver 604, the
16 library 262 also includes the necessary jacks and connections to allow the system to be
17 connected to the viewer 266. As shown in Figure 6c, the library 262 communicates
18 the text data to the viewer in a secure format which requires a key 605 for decryption.
19 The text is generally only decrypted page by page just before viewing.

20 a. The Video Connector

21 Figure 7 shows the flow of the processes performed by the video connector
22 212. The video connector receives the video signal 608, tunes to the channel
23 containing the text data 612, strips the text data from the video signal 616, and
24 communicates the text data stream to logic components in the library 620.

25 The connection to the video distribution system is preferably a cable connector
26 to a cable television delivery system, as shown in Figure 6c. The cable connector
27 includes a data stripper circuit 617, which accepts video input from either a set top

1 converter, TV or VCR 601, or an optional tuner block 613 that receives the CATV
2 signal through the cable connector 212'. The data stripper circuit 617 strips data out
3 of the video, and outputs a digital bit stream to the digital logic portion 609 of the
4 library unit 262. The data is embedded in the video signal either in the vertical
5 blanking interval or the active video portion in an encrypted and compressed format.
6 The data stripper circuit 617 can be placed inside the set top converter box 601, TV,
7 or in the library unit. The data stripper circuit 617 outputs the digital bit stream to be
8 used by the library digital logic 609.

9 The video connector 212 may also contain a channel tuner module 613 that
10 can tune to the video channel and provide access to the video that contains the data to
11 be stripped. Using the optional tuner module 613, a set top converter, VCR, or TV
12 tuner is not needed in the home subsystem. The optional tuner module 613 would
13 instead receive the CATV signal directly through the cable connector 212'.

14 b. Library

15 An embodiment of the library 262 for a two unit home subsystem is shown in
16 both Figure 6c and Figure 8. The embodiment shown includes the following optional
17 parts the video connector 212, phone connector 270, RF transceiver 604, and battery
18 pack 624 in addition to a removal portable memory 600', microprocessor 628,
19 instruction memory unit 632, digital logic 636, and power unit 640.

20 The library 262 contains a digital logic section 609 (not shown in Figure 8)
21 which includes the microprocessor 628, the digital logic 636 and the instruction
22 memory unit 632. The microprocessor 628 is preferably a secure microprocessor such
23 as the Mot SC21 device sold by Motorola. The digital logic section 609 will receive
24 the serial digital bit stream from the data stripper circuit 617 and process the data.
25 Error correction will also be performed by the digital logic section 609 and the data
26 will be checked for proper address. If the address of the data is correct and the library
27 262 is authorized to receive the data, the data will be transferred to the memory

1 storage unit 600, 600'. Authorization to receive the data is provided by the cable
2 headend or another distribution point. An authorization code may be sent in the serial
3 digital bit stream. The digital logic section 609 will send appropriate text and
4 graphical data to the memory storage unit 600, 600'. It transfers this data in a
5 compressed and encrypted format and the data remains stored in a compressed and
6 encrypted format.

7 i. Memory Storage Unit

8 The memory storage unit of the library 262 may be a removable portable
9 memory unit 600 (as shown in Figures 6a, 6b and 8). A variety of options are
10 available for memory storage: a hard disk drive, such as an 80 megabyte, a 200
11 megabyte, a hard disk with removable platters, and CD ROM. Referring to Figure 6c,
12 a hard disk drive unit 600' which contains removable platters may also be used. This
13 would provide virtually unlimited library storage capacity. Data will be stored in the
14 memory storage unit in a compressed and encrypted format. As is also shown in
15 Figure 6c, the data will also contain a key or unique ID number that matches the ID or
16 key of the viewer 266. This matching of a unique key or ID number prevents
17 unauthorized transfer of text data from the memory storage unit to an unauthorized
18 viewer. Small memory devices such as smart cards, electronic memory cards or
19 PCMCIA cards (personal computer memory card industry association) may also be
20 used to store the data.

21 ii. Power Circuitry

22 As shown in Figures 6b and 8, the library 262 will accept power from either
23 AC wall power or optional battery power. It is preferred that the power circuitry
24 provide all the voltage necessary from either the battery 624 or AC unit for the various
25 circuitry in the library. Preferably the power circuitry will also provide power to the
26 viewer through a single data cable when connected to the viewer. The power circuitry
27 will recharge the battery using AC power when in operation. With the optional

1 battery unit 624 installed, the library 262 becomes a portable unit and can still provide
2 power to the viewer 266. In order to extend battery life, power conservation measures
3 may be utilized, such as shutting down the memory system when not in use. When
4 the viewer 266 is being utilized and the library circuitry is not being utilized, virtually
5 all power may be shut down to the library 262.

6 iii. Connection to the Public Telephone System

7 The connection to the telephone system is preferably provided by a modem
8 611. Various available modems may be used to perform this function. As shown in
9 Figure 6c, cellular phone or PCN phone connections 611' may also be provided.
10 When the home subsystem 258 is first initialized, the modem will be used to transfer
11 the name and credit card information of the consumer to the billing and collection
12 subsystem 278. The telephone connection 270 may be utilized each time a book is
13 purchased by a consumer to complete and record the transaction. The telephone
14 connection 270 may be used as a means for receiving the text data from the operations
15 center, by-passing the video distribution system. The phone connection 270 may be a
16 separate unit as shown in Figure 6c. Alternatively, network 201 may also be used to
17 receive the text data from the operations center, by-passing the video distribution
18 system.

19 iv. Library Processing

20 Figure 9 shows an example of some basic processing performed by the library
21 262 on the data stream received from the video connector 212 or stripper circuit 617.
22 First the data stream is checked for error correction by block 650. If an error is
23 detected, block 654 de-interleaves the data followed by block 658 running a FEC
24 (Forward Error Correcting) algorithm. The combination of block 650, 654 and 658
25 perform the error correction needed on the data stream. If no error correction is
26 necessary the data proceeds to block 662 where packets are individually checked for
27 packet address.

1 If the address is a unique address, block 666 checks whether the address of the
2 packet matches the library box ID number. The library box ID number is a unique
3 number associated with that library 262 which is used to ensure security of the data.
4 Block 670 determines whether an electronic file has already been opened into which
5 the data packet can be saved. If no data file has been opened then block 674 opens a
6 new data file for that packet. If an electronic file has been opened, then the packet is
7 saved in that electronic file on disk, block 678. Next, the process checks to see if this
8 is the last packet for a particular book for a particular textual data block being
9 received 682. If it is the last packet of information, then the electronic file is closed
10 and the directory of available electronic files is updated 686. Following either block
11 682 or 686, the process returns to receive another data packet from the data stream
12 received from the data stripper block.

13 With the packet address is checked and the address is determined to be a
14 broadcast address, the process determines the type of message that is being sent 690.
15 The message is then stored in appropriate electronic message file 694 and the process
16 is returned to block 650 to receive another data packet and perform another error
17 check.

18 Using the process of Figure 9, the library is able to receive, store and update
19 directories related to the textual data and graphical data that can be used to depict
20 pictures in a given book. Variations of the processes are possible depending on the
21 format of the data and operating system of the library 262.

22 Figure 10 shows an example of the processing of information requests from
23 the viewer 266 at the library 262. Information requests from the viewer 266 are
24 received either through the cable connecting the viewer 266 to the library 262 or
25 through wireless transmissions such as RF. It is possible in some embodiments for
26 subscribers' requests to come from a set top converter box 602.

1 Information requests received from the viewer 266 generally fall into three
2 categories: (1) directory data of electronic books stored in the library 262, (2) index
3 of all available electronic books on the system, and (3) requests for a specific
4 electronic book (Block 700). Process block 704 answers a request from the viewer
5 266 for a directory of data showing the electronic books stored at the viewer 266. The
6 directory of data is sent to the viewer 266 so that it may be displayed to the subscriber.
7 Process block 708 handles requests from the viewer 266 for an index of all available
8 electronic books on the system. The library 262 will obtain an index of all the
9 available electronic books on the system and transmit that index, process 712, with
10 menu information to the viewer 266. Process block 716 replies to a request from the
11 viewer 266 for a specific electronic book. The library 262 opens an electronic file for
12 the specific electronic book requested by the viewer 266 and transmits the record or
13 transmits the information on a packet-by-packet basis to the viewer, 720. This process
14 of transmitting the specific electronic book, record, or packets to the viewer 266
15 continues until the last record or packet has been sent, 724.

16 In addition to the processes shown on Figure 10 in handling a request for a
17 specific electronic book, the library 262 also orders and receives specific electronic
18 books from the operations center 250 using the process as described in 716.
19 Following a request for a specific electronic book which is not stored at the library
20 262, the library 262 will proceed to determine the next available time the electronic
21 book will be on the video distribution system 208 and ensure reception and storage of
22 that electronic book (process not shown). In performing this process, the library 262
23 will transmit to the viewer 266 information on when it will obtain the text data for the
24 electronic book so that the subscriber may view the electronic book. In addition to
25 timing information, price and other ordering information may also be passed by the
26 library unit 262 to the subscriber.

1 c. The Viewer

2 Figure 11 is a block diagram of a viewer 266 showing its internal components.
3 The viewer 266 of Figure 11 is similar to the viewer 266 depicted in Figure 6c. The
4 viewer 266 is designed to physically resemble a bound book. The viewer 266 is
5 made up of five primary components and four optional components: (1) LCD display
6 602, (2) digital circuitry (not shown), (3) video graphics controller 607', (4) controls
7 740, (5) book memory 728, (6) optional power supply circuitry 736, (7) optional
8 battery 603', (8) optional RF transceiver 604, and (9) optional cellular or mobile
9 communicator (not shown).

10 (1) A high resolution LCD screen, preferably of VGA quality, is used by
11 the viewer 266 to display text and graphic images. The screen is preferably the size of
12 one page of a book.

13 (2) Digital circuitry that includes a secure microprocessor 621, instruction
14 memory 732, and digital logic. Data is transferred to the viewer 266 in compressed
15 and encrypted format. The secure microprocessor 621 compares the ID number of the
16 viewer 266 with the incoming data stream and only stores the text data if the ID
17 number of the viewer 266 matches that within the incoming data stream. It is
18 preferred that the viewer 266 not output text data or other data and that the data is
19 decompressed and decrypted only at the moment of viewing and only for the current
20 page being viewed. These measures are preferred because they provide additional
21 security against unauthorized access to data.

22 (3) A video graphics controller 607' that is capable of assisting and
23 displaying VGA quality text and graphic images is included in the viewer 266. The
24 graphics controller 607' is controlled by the digital circuitry described above. Text
25 may be displayed in multiple font sizes.

26 (4) The viewer 266 of Figure 11 has touch panel controls 740. The
27 controls 740 allow the consumer to select stored books and books from catalogues,

1 move a cursor, and turn pages in a book. Typically, the preferred controls include
2 forward and reverse page buttons 741, a ball 743 for cursor movement, a selection
3 button 745, a current book button 747 and a bookmark button 749 (see Figure 14a).
4 Other control features could be incorporated into the touch panel controls 740
5 including a touch pad, for example. Finally, the display 602 may be made touch
6 sensitive.

7 (5) Book memory 728 for at least one book or more of text is included in the
8 viewer 266. The memory 728 stores text and any graphics which represent pictures in
9 a book. The memory 728 can also store menu graphics data. Two different memory
10 728 devices may be used in the viewer 266, one for the instructions for the
11 microprocessor 621 in the digital circuitry and a second type of memory may be used
12 for the book memory 728. Various memory devices available on the market may be
13 used such as, ROM, RAM or a small hard disk. Since a book requires approximately
14 0.6 megabytes of storage, a small hard disk providing approximately 60 MBytes of
15 storage provides memory to store approximately 100 books. Text for books may be
16 stored in various font sizes so that larger or smaller fonts may be recalled from
17 memory 728 as desired.

18 (6) Power supply circuitry 736 in the view will accept power from either
19 an AC power source or from an optional battery 603', or the library 262. The power
20 supply circuitry provides the necessary voltages to accommodate the various systems
21 within the viewer 266.

22 (7) An optional battery 603' is provided in the preferred embodiment. The
23 battery 603' is automatically recharged when AC power is available.

24 (8) An optional RF transceiver 604 which provided two-way data link
25 between the viewer 266 and other components of the home subsystem can also be
26 included in the viewer 266.

(9) Also, the viewer 266 may include a cellular transceiver (not shown) for mobile communications.

The viewer 266 of Figure 11 has parts available for providing a library connection 744, electronic card memory 748, CD ROM units 752, and a portable memory unit 756 (such as that shown in Figure 6c 600'). Various electronic memory cards such as PCM CIA can be used with this viewer 266.

Security, low power consumption and excellent display technology are desired features of the viewer 266 design. The viewer 266 should be lightweight and portable. The viewer 266 contains a software operating system that allows electronic books to be stored, read and erased and includes the capability to order books and retain them in memory for a predefined period of time determined by the system operator. The software can be configured to allow the book to be read during a period of time (i.e., two weeks) and then automatically erased, read once and erased, or held in memory permanently. Each viewer 266 has a unique key 605. All of the data storage is encrypted with the key 605 for an individual viewer 266 to prevent more than one viewer device 266 accessing the text file or book file.

Figure 12a is a flow diagram of some of the processes executed by the viewer 266. Generally, the viewer 266 receives inputs from the subscriber through touch panel controls 740. The subscriber's information requests are then processed 800 by the viewer 266.

If the subscriber requests a menu of available books, process block 804 will select a book menu. Process block 808 will open the electronic files which list the books that are available (related to the category of topic of the menu) and display the menu with the names of the available books.

If the subscriber selects a particular electronic book to read, then process block 812 will process the selection and determine the electronic file that contains the specific electronic book. Process block 816 will open the file for that specific

1 electronic book and normally access the first page. (If a pointer has already been set
2 in that electronic book's file, the process may default to that pointer.) Process block
3 820 will then determine which page needs to be displayed. Process block 820 will
4 determine whether a next page, previous page or a bookmarked page needs to be
5 displayed. If the pointer for the electronic file is not in the correct location then
6 process block 828 will move the pointer and obtain the previous page of data from the
7 stored file. Otherwise, process block 824 will normally obtain the next page of text
8 from the stored electronic file. Process block 832 will decrypt and decompress the
9 text data and send the data to the video display. The video display will generally have
10 a video display memory associated with it and process block 832 will send the data
11 directly to that video display memory. The circuitry for the display then completes the
12 process of displaying the page of text.

13 If the subscriber, through the controls 740, requests (from process block 800)
14 that the power be turned off, then the process, 836, of turning the power off will be
15 initiated. Process block 840 saves the pointer in memory to the page number in the
16 book that the viewer 266 is currently reading. Process block 844 closes all the
17 electronic files and signals the power circuitry to shut down the power to the various
18 circuits in the viewer 266. With these examples of basic processes the viewer 266 is
19 able to display book selections and display text from those books.

20 Figures 12b and 12c are flow diagrams of additional processes executed by
21 viewer 266 and include functions related to display of various library menus and
22 searching for electronic books. These processes may be implemented by software
23 stored in memory 732 for controlling operation of microprocessor 621 in viewer 266.
24 Alternatively, these processes may be executed by microprocessor 628 in library 262.
25 In addition, they may reside in modules, implemented in software, hardware, or a
26 combination.

1 These processes permit a user to view different types of library menus based
2 upon various criteria and thus increase the versatility of the viewer in presenting
3 information to a user. For example, a user may retrieve and view all electronic books
4 stored in the viewer 266 by a particular author or having a particular title. A user may
5 also view electronic books within a particular category or genre. Upon viewing
6 retrieved electronic books with these menu functions, a user may select a particular
7 electronic book. Therefore, the library menu and searching functions permit more
8 flexibility and versatility in the manner in which a user may view and retrieve
9 electronic books, simplifying the retrieval of particular electronic books for the user
10 by typically reducing or eliminating a need for the user to manually search through a
11 list of displayed electronic books in order to locate a particular one of the electronic
12 books.

13 As shown in Figure 12b, process block 801 displays a main library menu.
14 Process block 803 determines whether a user has entered a request for a particular
15 type of library menu, and this process block may correspond with process block 800
16 for information requests. In order to enter a request, a user may manipulate controls
17 740 to enter various selections or other information. If a user did not enter a request
18 for any particular type of library menu, process block 805 generates and formats a
19 default library menu, which may include, for example, a numerical listing of the
20 stored electronic books. The viewer 266 may display the default menu.

21 Traditional libraries with paper, or hard-copy, books may be organized
22 according to one of several different classification schemes. For example, the Library
23 of Congress (LC) classification system may be used to organize book in a law library.
24 The Dewey Decimal Classification (DDC) system is the most widely used book
25 classification system in the world. Both the LC and DDC systems classify books
26 according to one of several classes. For example, the DDC provides ten main classes
27 of knowledge. The DDC number for a particular book may be a nine-digit number,

1 for example. The DDC system is available in electronic format to be used in an on-
2 line classification scheme.

3 Categorization according to Library of Congress numbers is explained in, for
4 example, the following text, which is incorporated herein by reference: Lois Mai
5 Chan, "Immroth's Guide to the Library of Congress Classification," Libraries
6 Unlimited, Inc., pp. 19-51 (4th ed. 1990). Categorization according to Library of
7 Congress numbers and Dewey Decimal Classification System numbers is explained
8 in, for example, the following text, which is incorporated herein by reference: Sheila
9 S. Intner & Jean Weihs, "Special Libraries: A Cataloguing Guide," Libraries
10 Unlimited, Inc., pp. 211-241 (1998).

11 Books may also be categorized according to an International Standard Book
12 Number (ISBN). In general, ISBNs are unique numbers identifying books, and the
13 ISBNs are assigned by a variety of agencies. Book publishers apply to these agencies
14 in order to obtain a range of ISBNs with a unique prefix, and the publishers assign
15 those numbers to their books. The publishers choose which of those numbers to
16 assign to their books and, while the prefix usually identifies a publisher, the ISBNs
17 typically have no relation to the subject matter of the books to which they are
18 assigned. An ISBN is usually ten characters long, the first nine characters identifying
19 a book and the last character used as a checksum. ISBNs are explained in, for
20 example, the following text, which is incorporated herein by reference: "The ISBN
21 System Users' Manual," International ISBN Agency, Druckerei Gerike GmbH, 1000
22 Berlin 36, pp. 4-23 (1986).

23 Once a library is organized according to a classification scheme such as the
24 DDC, a particular book can be easily located by reference to the book's DDC number.
25 Furthermore, with on-line DDC systems, a particular book can be located by use of
26 author and title information, for example. If an author's name is specified, the
27 computerized DDC system should produce a list of all books in the library written by

1 the author. A screen display or printout can then be viewed, listing each book and its
2 associated DDC number. Using the DDC number, a subscriber can locate a desired
3 book on a bookshelf in the library.

4 In addition to a book classification system, the library may logically organize
5 books having a common theme or characteristic. For example, all physics books
6 would be located in one physical location in the library. The physical presence of
7 books on a shelf helps a subscriber find material on a desired topic.

8 The electronic book home system 258 may have an electronic equivalent of a
9 physical bookshelf. For example, as shown in Figure 14u, the default menu may
10 optionally include a display providing an illustration of a bookcase containing books
11 of particular categories, for example, in certain shelves, such as a shelves 874 and
12 876.

13 Additionally, the home system 258 may include a book classification system
14 that allows the subscriber to organize his electronic books in a manner similar to that
15 used by a library. That is, the electronic books may be organized according to the
16 DDC or similar system, for example. The DDC system may be adapted to the
17 delivery system 200 by using an electronic version of the DDC system. Any
18 electronic book provided by a content provider may have, as part of its electronic data,
19 the DDC number, for example. The home system 258 may incorporate software to
20 interpret the DDC system and to generate a database of current holdings within the
21 home system 258.

22 Figure 14v shows an electronic book library classification system 1200 that
23 may be used to organize electronic books.

24 As shown in Figure 12b, if the user entered a request for a particular type of
25 library menu, process block 807 displays options for the various library menus and
26 receives a request for a library menu from a user. The types of library menus may
27 include, for example, the following: an alphabetical listing or index of the electronic

1 books by title (process block 809); an alphabetical listing of the electronic books by
2 author (process block 811); a listing of the electronic books by ISBN or DDC number
3 (process block 813); a listing of electronic books within a particular category (process
4 block 815); and a user-defined menu of the books (process block 817). The categories
5 may include, for example, all electronic books concerning a particular subject matter
6 and one or more DDC categories. Examples of categories are shown in Figure 14d.

7 The user-defined option permits a user to define a menu, such as, for example,
8 all electronic books by a particular author within a particular category, or electronic
9 books concerning a particular time period. In order to enter text to specify a user-
10 defined option, or other options, the viewer 266 may present the user with a listing of
11 the letters of the alphabet, as shown in Figure 14j, and permit the user to enter a
12 textual information using controls 740. Alternatively, a user may make use of a wired
13 or wireless keyboard for entering information. An example of other information to
14 include within a displayed menu or index includes summary and end note information
15 associated with each of the electronic books in the index.

16 Process block 819 generates a library menu based upon either a user's entered
17 option or a user-defined option. The generation of the menu typically occurs by
18 accessing data associated with the electronic books, and this data may include a
19 header file, associated with each electronic book, that contains information about the
20 electronic book. Alternatively, the accessed data may include text within the
21 electronic book, such as an ISBN, LC, or DDC number, or the full text of the
22 electronic book. Therefore, process block 819 may use the header information, or
23 search the full text or a sub-set of the full text of the electronic book, in order to
24 generate a library menu.

25 The information contained in the header file is used to identify and categorize
26 each electronic book for display and searching purposes. As new electronic books are
27 loaded on the viewer 266 or library unit 262, this header information is extracted from

the header file and stored in a database resident on the viewer 266 or library unit 262, such as in memory 600 or 600'. Upon the user making a selection from a menu, software residing on the viewer 266 or library unit 262 functions to: access this database to retrieve the header information for all resident electronic books; search the relevant fields of each database record to determine whether the electronic book matches the requested criteria; and compile the resulting information for electronic books where matches occurred.

This process supports either the display of a default menu (process block 805), such as all electronic books by selected display option, or the display of only electronic books matching selected search options. The header information associated with each electronic book typically includes the information shown in Table 1 and can be stored, for example, in records or other database structures.

Table 1

Title:		
Authors:		
Primary Author:		
Author 2:		
Author 3:		
Author 4:		
Author 5:		
ISBN #:		
LC#		
DDC#		
Publisher:		
Edition Number:		
Date of Publishing:		
Related Categories:		
Category 1		Category 6
Category 2		Category 7
Category 3		Category 8
Category 4		Category 9
Category 5		Category 10
Related Keywords:		
Keyword 1		Keyword 6
Keyword 2		Keyword 7
Keyword 3		Keyword 8
Keyword 4		Keyword 9
Keyword 5		Keyword 10

1 User Defined Criteria 1:
2 User Defined Criteria 2:
3 User Defined Criteria 3:
4 User Defined Criteria 4:
5 User Defined Criteria 5:
6 Book Summary/Description:
7 User Entered Notes:
8

9 Book summary and end note information associated with each of the electronic
10 books can be displayed on the viewer 266 along with the book title to provide the user
11 with additional information prior to determining whether to select a particular
12 electronic book for reading. Summary and end note information may include
13 information entered by the user, such as a user's notes, and is typically stored in the
14 field "user entered notes" in the header file for each book.

15 Users can also create user-defined criteria to associate with each electronic
16 book. Alternatively, the user can create and later view notes associated with each
17 electronic book. This user-created information is also stored in the database. These
18 user-defined criteria and notes can be created by entering textual information using the
19 presented alphabet and manipulating controls 740 as described above, or alternatively
20 via an on-screen simulated keyboards using controls 740 to select keys on the
21 keyboard, or finally via a remote keyboard electronically connected to the viewer 266
22 or library unit 262.

23 After the appropriate library menu is generated, either in process block 805 or
24 819, process block 821 displays the library menu on the viewer 262. The library menu
25 provides an indication of the electronic books within the menu; for example, it may
26 list the books by title and author, as shown Figure in 14c. Upon display of the library
27 menu, a user typically has an option to select and view a particular electronic book.
28 Process block 823 determines whether the user has selected an indication of a
29 particular electronic book. Selecting an electronic book may involve, for example,

1 using ball 743 to position the cursor on the indication of a book and using button 745
2 to select the electronic book. If a user has selected an electronic book, process block
3 825 retrieves and displays the selected electronic book on viewer 266, an example of
4 which is shown in Figure 14s.

5 Process block 827 determines whether a user has another request for a library
6 menu. If so, process block 807 displays the library menu options and the process of
7 displaying a library menu is repeated.

8 In addition to displaying various types of library menus, the viewer 266 or
9 library 262 may permit a user to search a database of stored electronic books. An
10 example of this process for searching is illustrated in Figure 12c. Process block 829
11 receives a search request, and this process block may correspond with process block
12 800 for receiving an information request. Process block 831 displays search options
13 on viewer 266 and permits a user to select a particular type of search.

14 Figure 14w shows an example of a main menu 854 on the viewer 266 for
15 displaying search options. A user may select one of the sections 1201 to enter an
16 option, and this selection may occur by using the cursor to "click on" the appropriate
17 section. In section 1202, a user may enter the text to search, and the user may enter
18 the text using the displayed letters or keyboard, or other types of keyboards, as
19 described above. For a user-defined search, the viewer may prompt the user to select
20 the multiple search criteria by selecting the appropriate sections 1201 and entering text
21 in section 1202 for each selected criteria.

22 Process block 833 receives a search parameter entered by a user, and this
23 search parameter may include, for example, one of the following: a word or grouping
24 of words in the title (process block 835) or other classification number such as an LC
25 or DDC number; an author name (process block 837); an ISBN (process block 839); a
26 type of category (process block 841); and user-defined criteria (process block 843).
27 User-defined criteria may be useful for a user to create particular type of search

1 involving varying parameters. For example, a user may want to search for all
 2 electronic books in a particular category having a particular word in the title. A user
 3 may enter textual information, as possibly required for a search parameter, as
 4 explained above using a presented alphabet and manipulating controls 740, such as is
 5 shown in Figure 14j.

6 After receiving the search parameter or parameters, process block 845 searches
 7 the database of stored electronic books in library 262 in order to locate any electronic
 8 books satisfying the search criteria. The searching may be accomplished using the
 9 process as described with respect to process block 819. Process block 847 determines
 10 whether the requested electronic books were located in the database. The system may
 11 search for the requested electronic books by, for example, accessing and searching
 12 data associated with the electronic books such as the appropriate fields of the header
 13 information shown in Table 1 for all stored electronic books, the full text of the
 14 electronic books, or a sub-set of the full text of the electronic books.

15 The searching may be accomplished using searching algorithms known in the
 16 art, examples of which include the following: sequential search; basic sequential
 17 search; self-organizing sequential search: move-to-front method; self-organizing
 18 sequential search: transpose method; optimal sequential search; jump search; sorted
 19 array search; binary search; interpolation search; interpolation-sequential search;
 20 hashing; practical hashing functions; uniform probing hashing; random probing
 21 hashing; linear probing hashing; double hashing; quadratic hashing; ordered and split-
 22 sequence hashing; reorganization schemes; optimal hashing; direct chaining hashing;
 23 separate chaining hashing; coalesced hashing; extendible hashing; linear hashing;
 24 external hashing using minimal internal storage; perfect hashing; recursive structures
 25 search; binary tree search; randomly generated binary trees; random binary trees;
 26 height-balanced trees; weight-balanced trees; balancing by internal path reduction;
 27 heuristic organization schemes on binary trees; optimal binary tree search; rotations in

1 binary trees; deletions in binary trees; m-ary search trees; B-trees; 2-3 trees;
2 symmetric binary B-trees; 1-2 trees; 2-3-4 trees; B-tree variations; index and indexed
3 sequential files; digital trees; hybrid tries; tries for word-dictionaries; digital search
4 trees; compressed tries; Patricia trees; multidimensional search; quad trees; and K-
5 dimensional trees.

6 If no electronic books were located satisfying the search parameter, process
7 block 849 typically displays a message on the viewer indicating that no electronic
8 books were found. If electronic books are located, process block 851 displays the
9 results of the search on viewer 266, providing an indication of the found electronic
10 book or books; for example, it may list the electronic books by title and author, as
11 shown Figure 14c. A user typically may have the option to select any of the found
12 electronic books, which may involve processing similar to that performed by process
13 blocks 823 and 825. After the search, process block 853 determines whether a user
14 requests another search.

15 d. Menu System

16 It is preferred that the electronic book system have a menu system for selecting
17 features and books from the electronic book system. The operating software and
18 memory required for the menu system is preferably located at the viewer 266.
19 However, it can also be located at the library 262, or the library 262 and the viewer
20 266 can share the software and memory needed to operate the menu system. Since the
21 menus are usually displayed on the viewer 266 and it is preferred that the viewer 266
22 be capable of operating in the absence of the library 262, the basic software and
23 memory to create the menus is more conveniently located at the viewer 266.

24 The preferred menu system is a system which allows sequencing between
25 menus and provides menu graphics for graphical displays such as on the viewer 266.
26 In a system which uses a set top converter, these menus may also be displayed on a
27 television screen. In the simplest embodiment, the menus provide just basic text

1 information for the subscriber to choose from. In more sophisticated embodiments,
2 the menus provide visual displays and icons to assist the subscriber.

3 Figure 13 depicts a menu system with sequencing. The primary menus in the
4 system are an introductory menu 850, a main menu 854 and various submenus 858.
5 In the embodiment shown, there are three levels of submenus. In certain instances one
6 or two submenus is sufficient to easily direct the subscriber to the selection or
7 information requested. However, there are features in which three or more submenus
8 makes the user interface more friendly for the subscriber. Each level of submenus
9 may consist of various menus. The particular menu displayed depends on the
10 selection by the subscriber on the previous shown menu. An example of this tree
11 sequence of menus are the help submenus 887, 888. Depending upon the specific
12 help requested, a different menu is displayed.

13 An example of an introductory menu 850 is shown on Figure 14a. Generally
14 the introductory menu 850 introduces the viewer 266 to the system and provides
15 initial guidance and instruction. The introductory menu 850 is followed by a main
16 menu 854, an example of which is shown in Figure 14b. The main menu provides the
17 viewer 266 with the basic selection or features available in the system. For example,
18 Figure 14b shows that the viewer 266 is able to choose by a point and click method,
19 six available options; (1) free previews, (2) books you can order, (3) books in your
20 library, (4) your current book, (5) help, and (6) other system features. Following a
21 selection on the main menu, a submenu is shown.

22 Figure 13 shows ten available primary or first level submenus. They are (1)
23 account set up 862, (2) free previews 866, (3) books in your library 872, (4) books you
24 can order 878, (5) your current book 884, (6) help 887, (7) available features 890, (8)
25 messages 893, (9) account information 896 (10) outgoing message submenu 898.
26 Figure 14c is an example of a first level submenu for books in your library 872. This
27 "Book In Your Library" submenu shows six available books by title and author and

1 provides the subscriber with the ability to check a different shelf of books or return to
2 the main menu. Figures 14d and 14e show other submenus for books that may be
3 ordered using the "Books You Can Order" submenu.

4 The "Account Set Up Menu" 862 and further submenu us related to account
5 set up (which provide instructions and account input 864) are shown in Figures 14f
6 through Figure 14m. These submenus allow initialization of an account at the
7 operations center and orders to be charged to credit cards. The submenus include the
8 ability to enter data related to your credit cards.

9 Free previews for books 866 are also provided by submenus (868, 870).
10 Examples of the free preview menus are shown in Figure 14n, Figure 14o, and Figure
11 14p.

12 Referring to Figure 13, submenus are shown on the "Books In Your Library"
13 submenu 872 and are preferably broken into shelf numbers with submenus for each
14 shelf 874, 876. The submenus on the "Books You Can Order" submenu 878 is
15 similarly broken out into submenus by shelves 880, 882. These shelves may each be a
16 category or genre of books. Books may be grouped into categories such as best
17 sellers, novels, fiction, romance, etc. See Figure 14d.

18 Referring to Figure 13, the submenu for "Your Current Book" allows a
19 subscriber to select a current book 884 and then determine what page to view. This
20 selection is confirmed with submenu 885. The help submenu provides the subscriber
21 with additional help screens 888. The submenus for available features 890 are
22 preferably broken out into a separate submenu for each feature 891, 892. Examples of
23 these features include the library menu and searching features explained with respect
24 to Figures 12b and 12c.

25 Referring to Figure 13, messages can also be sent with the electronic book
26 selection and delivery system. A level one message screen provides the subscriber
27 with the ability to select from the various pending messages he has 893. Each

1 message is then shown on a separate submenu screen 894, 895. An example of such a
2 submenu is shown in Figure 14q.

3 Referring to Figure 13, account information is shown on a level one submenu
4 896 and then follow-on submenus show the recent orders and your account balance
5 897. There is also a level one submenu for outgoing messages 898 which has a
6 follow-on submenu used as an input screen 899.

7 In addition to the specific features and submenus described in Figure 13 and
8 Figure 14a through Figure 14q, many other variations and features are possible.
9 Figure 14r is an example of a main menu with additional features and submenus
10 available. Examples of available features 890 identified in Figure 13 include the
11 library menu and searching features explained with respect to Figures 12b and 12c.

12 When a book is finally selected for viewing on the system it will appear on the
13 screen as shown in Figure 14s for the title and Figure 14t for a page of text.

14 III. The Billing And Collection System

15 The billing and collection system utilizes the latest technology in electronic
16 transaction and telephone switching to track orders, authorize deliveries, bill
17 consumers, and credit publishers automatically. The telephone calls initiated by the
18 phone connector are received by the billing and collection system which responds
19 immediately without human intervention by placing the order and charging the
20 consumers credit card account. Data is compiled periodically and publishers are
21 credited for sales of their books. The billing and collection system may also connect
22 with subscribers through two-way cable connections, cellular or other communication
23 means.

24 It is preferred that the billing and collection system communicate with the
25 operations center to track changes in available books and to provide statistical data to
26 the operations center.

27 IV. Library and Bookstore System

1 The electronic book system can be modified to be used at public libraries and
2 bookstores. Figure 15 shows one possible arrangement of components for a public
3 library or bookstore location. The main unit at public library or bookstore is the file
4 server 900. The file server 900 is a large electronic memory unit that can store
5 thousands of books. Various electronic storage means may be used in the file servers,
6 such as hard disks and read-write CD ROMs and read only CD ROMs.

7 The system comprises five components; a converter or video connector 904, a
8 controller 908, a viewer 912, and a catalog printer 916. The software for controlling
9 the system is primarily located in the controller. The converter or video connector
10 904 is similar to those described above. In this configuration the controller unit 908
11 monitors the data being transferred to the file server by the converter 904. The
12 controller 908 is preferably provided with a viewing screens and several control
13 buttons. When it is necessary to have a larger screen to perform more sophisticated
14 controlling of the system a viewer may be connected to the controller 908 and the
15 viewer screen and controls may be used.

16 The controller 908 is only able to download books to the viewer 912 which are
17 authorized to receive books from the particular file server. For security reasons it is
18 not desirable that the public viewer 912 have access to more than one file server. In
19 this way, security can be maintained over the text data for books. It is preferred that
20 the public viewer 912 be limited to receiving one or two books at a time from the
21 controller 908. When the user of the public viewer 912 needs a new or additional
22 book he returns the viewer 912 to the library where he receives a new book from the
23 controller 908.

24 In order to track the books that are available on the file server, the titles of the
25 available books may be printed on a catalog printer 916. The catalog printer 916 is
26 connected to the library controller 908 and the titles of the books are downloaded to
27 the catalog printer 916. None of the coded text for any of the books can be printed

1 using the controller 908 and catalog printer 916 of this system. In order to maintain
2 security over the data, none of the book data is allowed to be downloaded to the
3 printer. Once a complete printout of available book titles, magazines, or other textual
4 material is complete, a hard copy of the catalog 920 can be maintained at the file
5 server.

6 The system shown may also be used at bookstores. The bookstores can rent
7 the public viewer 912 to customers with the text for one or two books loaded onto the
8 viewer 912. The viewer 912 may be provided with an automatic timeout sequence.
9 The timeout sequence would erase the textual data for the books after a certain period
10 of time, for example, two weeks. It is expected that after a period of time (perhaps
11 within two weeks) the renter would return the public viewer 912 to the bookstore and
12 receive additional books for viewing. Using this arrangement, it is also possible for
13 the bookstore to (permanently) sell a viewer 912 to a regular customer. The customer
14 then returns to the bookstore from time to time to receive textual data for a book
15 which the customer can then store permanently on his own viewer 912. Various other
16 configurations are possible for bookstores and libraries using the file server and
17 viewer 912 described.

18 V. Use Of Set Top Converter

19 Existing set top converter boxes such as those made by Scientific Atlanta or
20 General Instruments are presently unequipped to handle the book selection system of
21 the present invention. Although set top converters may be built which include the
22 library functions, hardware modifications are necessary in order to use the book
23 selection system with existing set top converter technology.

24 Figures 16a and 16b are examples of hardware modification. A port is used to
25 attach hardware upgrades described below to a set top terminal. Two upgrades are
26 possible to set top converters 601 to assist in receiving and selecting electronic books.
27 A menu generation card upgrade (Figure 16a) and an information download unit

1 (Figure 16b). Each of these upgrades may be connected to the set top terminal unit
2 through an upgrade port. A four wire cable, ribbon cable or the like may be used to
3 connect the upgrade to the set top converter 601.

4 A card addition 950 to a set top converter 601 is depicted in Figure 16a. The
5 card 950 shown provides the additional functionality needed to utilize the book
6 selection system with existing set top converter 601 technology. The card 950 may
7 be configured to slip inside the frame of a set top terminal and become part of the set
8 top terminal, an advanced set top terminal. The primary functions the card 950 adds
9 to the set top converter 601 are the interpreting of data signals, generating of menus,
10 sequencing of menus, and, ultimately, the ability of the viewer 912 to select a book
11 using either the television or a viewer 912. The card 950 also provides a method for a
12 remote location, such as the cable headend, to receive information on books ordered.
13 The books ordered information and control commands may be passed from the cable
14 headend to the card 950 using telephone lines.

15 The primary components of the card 950 are a PC chip CPU 952, a VGA
16 graphic controller 954, a video combiner 956, logic circuitry 958, NTSC encoder 960,
17 a receiver 962, demodulator (not shown), and a dialer 611'. The card 950 operates by
18 receiving the data text signal from the cable headend through the coaxial cable. The
19 logic circuitry 958 of the card 950 receives data 964, infrared commands 966, and
20 synchronization signals (not shown) from the set top converter 601. Menu selections
21 made by the viewer 912 on the remote control are received by the set top converter's
22 601 IR equipment and passed through to the card 950. The card 950 interprets the IR
23 signal and determines the book (or menu) the subscriber has selected. The card 950
24 modifies the IR command to send the information to the set top converter 601. The
25 modified IR command contains the channel information needed by the set top
26 converter 601. Using the phone line 968 and dialer 611', the card 950 is able to

1 transmit books ordered information to the cable headend. It is also possible to receive
2 the books over the telephone lines and by-pass the video distribution system.

3 These commands are passed through the interface linking the set top terminal's
4 microprocessor with the microprocessor of the hardware upgrades. In this way,
5 subscriber inputs, entered through the set top terminal keypad or remote control, can
6 be transferred to any of the hardware upgrades for processing and responses generated
7 therein can then be sent back to the set top terminal for display. In the preferred
8 embodiment the IR commands 966 are transferred from set top terminal 601 to
9 hardware upgrade.

10 Hardware upgrades may include a microprocessor, interactive software,
11 processing circuitry, bubble memory, and a long-term memory device. In addition to
12 these basic components, the hardware upgrade may make use of an additional
13 telephone modem or CD-ROM device.

14 The information download hardware upgrade 1001 (shown in Figure 16b)
15 allows the subscriber to download large volumes of information from the operations
16 center or cable headend using the set top converter 601. The hardware upgrade 1001
17 will enable subscribers to download data, such as books and magazines, to local
18 storage. Primarily, the hardware upgrade 1001 is an additional local storage unit 1003
19 (e.g., hard disk, floppy, optical disk or magnetic cartridge and may include a
20 microprocessor 1005, instruction memory 1007, and a random access memory 1009,
21 as shown in Figure 16b). Preferably, a small portable viewer 912 is also provided
22 with the upgrade 1001 to enable downloaded text to be read without the use of a TV.

23 The downloadable information may be text or graphics supplied by the
24 operations center or cable headend. With this upgrade, books may be downloaded and
25 read anywhere with the portable reader. Using this upgrade, books may be
26 downloaded and stored in compressed form for later decompression. The books
27 would be decompressed only at the time of viewing. Important text that the public

1 desires immediate access may made available through this system. Text such as the
2 President's speech, a new law, or a recent abortion decision rendered by the Supreme
3 Court may be made immediately available.

4 In the preferred embodiment, book ordering information is stored at each set
5 top terminal until it is polled by the cable headend using a polling request message
6 format. An example of a polling request message format consists of six fields,
7 namely: (1) a leading flag at the beginning of the message, (2) an address field, (3) a
8 subscriber region designation, (4) a set top terminal identifier that includes a polling
9 command/response (or P/F) bit, (5) an information field, and (6) a trailing flag at the
10 end of the message. A similar response frame format for information communicated
11 by the set top terminal to the cable headend in response to the polling request may be
12 used.

13 Figure 17 shows a preferred set top terminal that includes a data receiver 617'
14 and a data transmitter 1011. The data transmitter provides upstream data
15 communications capability between the set top terminal 601 and the cable headend.
16 Upstream data transmissions are accomplished using the polling system described
17 and, using a data transmitter 1011. Both receiver 617' and transmitter 1011 may be
18 built into the set top terminal 601 itself or added through an upgrade module.
19 Regardless of the specific hardware configuration, the set top terminal's data
20 transmission capabilities may be accomplished using the hardware shown in Figure
21 17.

22 Figure 17 shows RF signals, depicted as being received at by a data receiver
23 617' and tuner 613 working in unison. Both of these devices are interfaced with the
24 microprocessor 1013, which receives inputs 1015, from the subscriber, either through
25 a set top terminal's keypad, a remote control unit or viewer 912. All cable signals
26 intended for reception on the subscriber's TV are accessed by the tuner 613 and
27 subsequently processed by the processing circuitry 1017. This processing circuitry

1 1017 typically includes additional components (not shown) for descrambling,
2 demodulation, volume control and remodulation on a Channel 3 or 4 TV carrier.

3 Data targeted to individual set top terminals is received by the data receiver
4 617' according to each set top terminal's specific address or ID. In this way, each
5 addressable set top terminal only receives its own data. The data receiver 617' may
6 receive set top terminal 601 specific data in the information field of the signal frame
7 described or on a separate data carrier located at a convenient frequency in the
8 incoming spectrum.

9 Any received data includes information regarding books and menus available
10 for selection. The subscriber may enter a series of commands 1015 using a keypad or
11 remote control in order to choose a channel or program. Upon receipt of such
12 commands, the set top terminal's microprocessor 1013 instructs the tuner to tune to
13 the proper frequency of the channel carrying data and subsequently instructs the
14 processing circuitry 1017 to begin descrambling of this data.

15 Upon selection of a book, the microprocessor 1013 stores any selection
16 information in local memory (not shown) for later data transmission back to the cable
17 headend. The set top terminal's microprocessor 1013 coordinates all CATV signal
18 reception and also interacts with various upstream data transmission components.
19 Typically, the data transmitter 1011 operates in the return frequency band between 5
20 and 30 MHZ. In an alternative embodiment, the frequency band of 10 to 15 MHZ
21 may be used. Regardless, however, of the frequency band used, the data transmitter
22 1011 sends information to the cable headend in the information field of the response
23 frame described. Those skilled in the art will recognize that a number of variations
24 and combinations of the above-described set top terminal hardware components may
25 be used to accomplish upstream data transmissions.

26 VI. Books-On-Demand System

1 The electronic book system described may also be configured in a book-on-
2 demand style. Figure 18a shows one example of a configuration for a book-on-
3 demand system. A book on demand system requires more powerful two-way
4 communications between the consumer's home, bookstore or library and either the
5 operations center 250 or a distribution site 1020 such as the cable headend. This type
6 of two-way communication can be provided by the hardware shown in Figure 17 and
7 described above.

8 Referring to Figure 18a, in a book-on-demand system, the subscriber selects
9 the book to be download from an available menu of books. The available menu is
10 usually sent to the subscriber location by the distribution site 1020. After his
11 selection, information about his selection (or request) is then communicated to either a
12 distribution point 1020 (such as a cable headend) or the operations center. Upon
13 receipt of this request, the needed textual and graphical information for the book is
14 spooled and sent to the subscriber. In this manner, books are only sent when
15 requested by the subscriber and are sent immediately upon demand for the book.

16 In order to support such a demand system, the text delivery and distribution
17 must be conducted on a strong nodal architected distribution system, such as, a
18 video-on-demand cable or telephone television system, or through use of individual
19 telephone calls on the public telephone system.

20 The book-on-demand system allows for a greater selection of books to the
21 subscriber and limits the amount of communicated book data that is unnecessary or
22 unneeded. It also provides the book to the subscriber in a much timelier fashion.

23 In addition to a stronger distribution system, a book-on-demand system
24 requires a distribution point 1020 to have more sophisticated equipment to spool out
25 the textual information. This can be accomplished using file server technology 1024
26 for storing the books and ATM 1028 or telephone-type switching (not shown) to
27 distribute the textual information. The file server 1024 and distribution technology

1 that can be used in configuring such a book-on-demand system is described in U.S.
2 Patent No. 5,262,875 and U.S. Patent 5,218,695, cited above.

3 Figure 18a shows an embodiment for a book-on-demand system that utilizes
4 file server technology. In addition to books, the embodiment of Figure 18a will
5 support distribution of nearly any digital data. Books or textual files are received
6 from publishers 282 and other sources through local feeds 1032, ATM 1028, or by
7 satellite dish 1036. The data is then stored in memory 1040 at the file server 1024.
8 Preferably, distribution point 1020 is a cable headend that receives requests from
9 subscribers and delivers text to subscribers over a two-way communication system
10 (such as a video-on-demand system (VOD) 1044).

11 The library 262 can be connected to either a basic premium-type service cable
12 system 1048, a near video-on-demand type cable system (or pay-per-view (PPV)
13 1052) or a video-on-demand cable system 1044. In connecting with either of these
14 three systems the library 262 may access the cable directly or may access the system
15 through a set top terminal 601', 601", or 601'''.

16 Using the two-way video-on-demand system 1044, a subscriber is able to
17 request a specific book title and receive that text immediately following its request.
18 To accomplish this, the distribution point 1020 transmits a list of available books
19 through the cable delivery system to the library 262. The library 262 displays the list
20 of available books on a menu or similar format. As described earlier, it is preferred
21 that the library 262 use menus which list categories of available books to form its
22 request from the distribution point 1020. After selecting a book the library 262 then
23 sends a request signal on the two-way communication system 1044 back to the
24 distribution point 1020. This request signal can be handled in two ways. Either the
25 library 262 initiates the request or the distribution point 1020 polls the various
26 libraries on to the two-way system 1044. Upon receiving the request for the book

1 title, the text associated with that book title is transmitted to the library 262 using the
2 two-way cable system 1044.

3 Figure 18b is an expanded view of an operations center 250 that supports a
4 regional or national book-on-demand system. In fact, the operations center 250 shown
5 supports distribution of nearly any digital data. The operations center 250 supports
6 multiple feeds to receive digital information by tape 1060, 1060', ATM 1028, or
7 satellite 1036. The information is processed through an input MUX 1064 and a small
8 file server 1068 before reaching the master file server 1072. Digital data such as
9 books received from publishers 282 is then stored on the master file server 1072. It is
10 preferred that the digital data is stored compressed in a standard format such as
11 MPEG2.

12 A system controller 1076 provides control over the regional or national book-
13 on-demand system. Books may be packaged into groups to provide feeds to various
14 cable headends. In addition, scheduling and marketing research are conducted at the
15 operations center 250. In order to handle the scheduling and market research, book
16 buy data is received at the operations center 250 through a multiplexer 1082. Book
17 buy information can be provided by the operation center 250 to the billing and
18 collection subsystem.

19 The operations center 250 is also equipped to insert messages or
20 advertisements into the file server. These messages or advertisements will eventually
21 be received by the subscribers.

22 The master file server 1072 uses an output multiplexer 1080 and ATM 1028 as
23 well as satellite connections to distribute digital data. In the preferred embodiment,
24 cable headends receive text data on books from the master file server 1080 through
25 the output multiplexer 1028 and an ATM system 1028. After receiving the digital
26 book data, the cable headends store the books in a local file server 1024. Figure 18a's
27 distribution point 1020 is an example of a cable headend which may receive data from

1 the operations center 250 of Figure 18b through an ATM hookup 1088 or satellite
2 hookup.